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"COVER PHOTO BY MALAK"

"A driller drives a blast-hole in ore on the 250 feet level".

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RENAUD'S PHENOMENON
OF OCCUPATIONAL ORIGIN
IN URANIUM MINERS

By N. WILLIAMS, M.B., B.S., D.P.H., D.I.H., and A. L. RIEGERT, B.A., M.A.

The Saskatchewan uranium mines (Figure 1) are located in the Beaverlodge area on the northern shores of Lake Athabaska. As these mines are within approximately 500 miles of the Arctic Circle, a reasonably rigorous climate is expected. The mean annual temperature is about 24°F.

Because of the low temperatures and inaccessibility of the region, maintaining a warm working environment is difficult and at the present time uneconomical. The working environment is aggravated by the fact that the mines are wet and the miners are continually being sprayed with water from the drilling machines. Only two of the mines have mechanical ventilation and supply

Figure 1—A typical small uranium mine in northern Saskatchewan

warmed air underground. The majority of the mines are small and rely on natural ventilation. The effective temperatures for some of the mines are given in Table 1. These figures are for the winter months, but as a rule the underground temperatures rise only a few degrees in summer.

Approximately nine years ago, coinciding with the development of Saskatchewan uranium mines, a new drilling machine appeared on the market. This new drill is small, weighs about 40-50 lbs. and has a reasonably high drilling rate. The drill is semi-supported on a leg fitted as an air cylinder, which lifts the drill and also exerts the necessary forward thrust against the drill steel. The miner generally uses one hand to guide the drill and to counteract a slight vertical motion caused by the leg as it pushes at an angle from below (Figure 2). The controls and handle are at the back of the drill and in line with the drill steel. Because of the supporting air cylinder leg, the drill became known as the "Jack-leg." It is used throughout the Saskatchewan uranium mines and is replacing older drills in other mines.

Presented at the 13th International Congress on Occupational Health.

Vibration Characteristics

The vibration characteristics of the Jack-leg drill were determined with the following General Radio Company instruments: Type 759-P35 Vibration Pickup with Type 759-P36 Control Box, Type 1551-B Sound Level Meter and Type 760-B Sound Analyser. The readings, in decibels, were converted to amplitude, velocity, and acceleration by means of the manufacturer's calibration tables. Measurements were made under actual working conditions with the pickup clamped rigidly to the drill handle (Figure 2). To determine the dampening effect various materials had on vibrations, the materials were taped around the drill handle and the pickup clamped tightly about them.

The vibration pickup is an inertia-operated Rochelle salt crystal, and it performs as an accelerometer. As is peculiar to all Rochelle salt devices, its performance is a function of temperature and humidity. Since the crystal is hermetically sealed in the pickup, humidity effects are negligible. Temperature effects, however, remain. If the response at 80°F is 100 per cent, the response at a temperature of 35-40°F is 80-81 per cent (1).

The various readings are recorded in Tables II and III. Each reading is the average of several readings, which in some cases varied over a considerable range. This is due to nonuniform drilling conditions. First, the air pressure supplied to the test drills varied between 99-102 psi. Because of this, the number of impacts per second (frequency) delivered by the test drills also varied. Secondly, the vibrations were most severe at the start of a hole and were least when the drill steel

TABLE I

EFFECTIVE TEMPERATURES IN URANIUM MINES

Position	Month	Dry Bulb ° F	Wet Bulb ° F	Globe Thermometer ° F	Air Movement (fpm)	Effective Temperature
Heated Mine						
Drift	Dec.	45	43	45	160	38.5
Shaft Station	Dec.	43	42	43	54	40.5
Haulage Way	Dec.	44	42	42	40	40
Unheated Mines						
Drift	March	47	45	47	47	44
Drift	March	41	40	41	50	39.5
Shaft Station	March	46	44	46	50	44
Haulage Way	Dec.	39	38	38	47	35

had penetrated to a depth of 8-10 ft. Actual measurements were made over a hole depth of 1-10 ft.

The scanning frequencies were varied manually, and only those showing prominent peaks were recorded. It turned out these were multiples of the main frequency of the drill vibrations, namely 2000 impacts per minute (33 per second) and 2400 impacts per minute (40 per second). In many cases there were no clear-cut peaks, but rather a broad band of frequencies, as in the 250-500 cps range, in which case the maximum amplitude, velocity, and acceleration were recorded. The desirability of a continuous recording of the vibration characteristics is obvious. At these main frequencies the vibration characteristics of the two machines were:

Drill A—frequency 30-33 cps; displacement .264 mm; velocity 12.4 cm/sec; acceleration 1080 cm/sec^2

Drill B—frequency 39-41 cps; displacement .381 mm; velocity 10.5 cm/sec; acceleration 2860 cm/sec^2

Clinical Details

The number of cases presented is relatively small, compared with the number of miners working in this area. Because of the isolation of the area with no rail or road communication to the outside world, and because in the earlier stages of development housing accommodation and other amenities were not such as to encourage many married miners to settle in the area, the industry has relied mainly on the migrant single miner, whose average length of stay at a mine was nine to 12 months. This situation is now beginning to change, but the majority of miners still have no roots in the area. A summary of the case histories is given in Table IV.

The first case, which incidentally is judged to be the most severe, was discovered as a result of inquiry as to the occurrence of Raynaud's phenomenon in miners following an initial survey of working conditions and the work environment. The discovery of the first case, whose occupational etiology had not previously been suspected, led to the decision to conduct an inquiry at one of the smaller mines where the working group was somewhat more stable and where it was known that the mine captain was himself a sufferer from occupational Raynaud's phenomenon and was expected

Figure 2—Typical drilling position: Note the vibration pickup clamped to the drill handle.

to know the extent of the problem among his miners. In this mine, then, all miners who regularly used the Jack-leg drill were interviewed and examined. Including the mine captain, previously mentioned, this made a total of seven miners. Also, three other cases were discovered at the mine where the original case was seen. Their ages ranged from 28 to 40 years, and the number of years of using the Jack-leg drill ranged from five to ten. In the one mine all seven had a history of Raynaud's phenomenon, the onset varying from two to six years after commencing use of the drill. On the average, a miner uses the drill for a period of about three hours during an eight-hour shift. Typically, the hand used to hold the drill handle was first affected, the condition first appearing in the tips of the mid or ring finger, later appearing in the little finger, and sometimes involving the whole hand. Some changed hands to control the drill after the onset of the condition, and this was followed by the appearance of Raynaud's phenomenon in the other hand also. One miner who was ambidextrous in his drilling work observed the condition appearing almost simultaneously in both hands.

While in most cases the trigger for the onset of an attack is cold, careful questioning of the miners reveals that in two cases the condition never appears unless the hands are exposed to vibration; in these the vibration transmitted from the steering wheel of a car driven over rough roads was sufficient, in cold weather, to precipitate an attack. In most of the other cases exposure to the environmental temperature in the mine was alone sufficient to trigger an attack. Drilling underground resulted in the appearance of the condition in a period varying from five minutes to four hours.

There is considerable variation in the severity of the condition. One man has been forced to give up mining because he could no longer grip the drill handle; another almost certainly would have had to but was fortunately promoted to a supervisory position. Some others are only able to continue by using the hand not affected, or least affected; another has to come out of the mine on occasions. It seems probable that with continuing exposure to

TABLE II

MODEL A JACK-LEG DRILL (with rubber handle)

Frequency (cps)	Unaltered Machine	VIBRATION-ATTENUATING MATERIAL ADDED				
		½-in Sponge Rubber	1-in. Cork	3/16-in. Plastic Foam	3/16-in Felt.	3/8-inch Felt
				DISPLACEMENT (mm)		
30-33	.264	.127	.0804	.451	.403	.320
60-66	.0622	.0451	.0254	.0320	.0352	.0451
90-99	.0622	.0451	.0143	.0143	*	.0254
120-126	*	.0451	.0320	.0254	*	*
				VELOCITY (cm/sec.)		
30-33	12.4	6.38	.802	8.20	6.38	10.7
60-66	2.37	1.27	.802	.862	1.60	1.03
90-99	1.54	2.02	.451	.802	.802	1.01
120-126	1.04	3.19	.451	.802	.451	.802
150-160	*	1.01	.802	1.01	(low Broad	*
210-215	.802	1.01	2.54	2.02	Band)	*
250-500	1.12	*	1.65	1.27	2.02	.802
				ACCELERATION (cm/sec²)		
30-33	1080	2020	802	1800	1600	1990
60-66	1180	1020	802	451	802	802
90-99	946	2070	730	802	1010	451
120-126	*	2020	802	802	1270	802
150-160	*	1510	1270	802	2540	802
210-215	*	1130	6370	3590	4510	1600
250-500	2420	451	2020	2420	4510	1010

*Too low to record

TABLE III

MODEL B JACK-LEG DRILL (with steel handle)

Frequency (cps)	Unaltered Machine	VIBRATION-ATTENUATING MATERIAL ADDED			
		½-in. Sponge Rubber	¼-in. Cork	¼-in. Plastic Foam	3/16-in. Felt
		DISPLACEMENT (mm)			
39-41	.381	.254	.254	.395	.254
78-82	.131	.0254	.0638	.254 - .101	.804 - .0184
120	*	.0452	.0254	.0452	.140
		VELOCITY (cm/sec)			
39-41	10.5	4.02	6.36	12.7	8.04
78-82	7.29	.804	1.01	.804	5.72
117-122	3.29	.804	1.01	.901	2.02
160	2.02	.804	.452	*	.452
250-500	*	.804	1.16	*	*
		ACCELERATION (cm/sec^2)			
39-41	2860	2540	3190	2540	2020
78-82	3040	804	1010	5070	1640
117-122	3590	1270	1600	3190	1010
160	*	804	452	*	*
250-500	804	1600	2670	*	*

*Too low to record

vibration the condition becomes progressively worse and will finally force many miners to retire from this work, at least in the conditions which obtain in this area.

Only one man was seen who no longer used the drills and in whom it was possible to surmise an opinion as to the progress of the condition. This miner had noticed a definite but small improvement in the disease during the five years he had not been drilling.

Although four cases had radiographs of the hand taken, in only one case, who was the one who had to give up the work, were the radiographic appearances of decalcification and cysts in the carpi evident.

There is reason to believe that the very high incidence found at this one mine also occurs at the other mines in the area. It seems that the miners are reluctant to report the condition for fear that it may jeopardize their prospects of obtaining employment.

Prevention

There appear to be two possible means of preventing, or at least delaying, the onset of Raynaud's phenomenon in these miners. The first is to raise the environmental temperature, but this is regarded as impractical in a climate where the air temperature in winter can fall as low as —60°F. In the larger mines, which are mechanically ventilated to control the radon and radon daughter hazard, the incoming air is heated, but even to obtain an ET of 40° the fuel costs are high. To attempt to achieve an ET of 70° would be completely uneconomical. Even though it is not practicable to raise the environmental temperature, it may be possible to reduce the chilling of the miners' hands by advising them to wear a pair of woolen gloves beneath the usual plastic gloves. Also, the miners should be advised to avoid getting the inside of their gloves and hands wet, as this undoubtedly leads to more rapid cooling of the hands. Water, used for dust prevention, can readily find its way into gloves unless they have cuffs which can be tucked well inside their rubber waterproof jacket sleeves.

The second method is to attempt to attenuate the vibration transmitted to the miners' hands. If we knew whether there was a range of frequency, amplitude, velocity, or acceleration which was specific in causing Raynaud's phenomenon, then we could attempt to modify the transmitted vibration so that it was outside this range; otherwise, the best that can be hoped for is to reduce the over-all vibration levels. The effects of various cushioning materials on the vibration characteristics are given in

TABLE IV

SUMMARY OF CASE HISTORIES

Case	Age	Years Jack-Leg drill used	Exposure before onset (yr)	R or L handed	Fingers first affected	Extent of condition when first seen	Trigger	Duration of work before each episode	X-ray hand	Remarks
L.L.	42	10	7	R(L)	R ring & little	L ring & little Whole of R hand	cold	30-60 min	decalci-fication & cysts	Has been forced to give up mining
Y.G.	33	9	6	L	L mid	L all fingers	cold	2 hr	normal	Finds drill without rubber grip brings on attacks earlier
E.W.	38	7	6	R	L mid, ring & little	R & L hands	cold	variable	normal	
P.H.	35	10	7	R & L	R & L mid, ring & little	R & L mid, ring & little	cold	3-4 hr		Causes grip to weaken
D.M.	38	5	5	L(R)	R & L all fingers	R & L all fingers	cold, aggravated by vibration	1 hr	normal	States condition improved since gave up manual work 4 years previously
A.S.	28	5	4	R	R tips all fingers	R tips all fingers	cold, aggravated by vibration	5-10 min		Some days Raynaud's phenomenon does not appear at all
D.F.	31	10	5	R	R all fingers	R all hand L all fingers	cold, aggravated by vibration	variable		
H.H.	29	8	4	R(L)	R & L mid fingers	R & L all fingers	cold	5 min		Sometimes has to go to surface for relief as he cannot hold drill
N.N.	28	7	2	R	R all fingers	R & L all fingers	vibration (never cold alone)	20 min		Driving a car also precipitates attack
J.P.	40	10	2	R	R mid & ring	R & L all fingers	cold, aggravated by wet	30-60 min		Blanching extends up to middle of palm
E.Y.	37	10	6	L	L index & middle	L index & middle	vibration aggravated by cold	variable		Driving a car also precipitates attack

Tables II and III. A perusal of these Tables reveals that materials which are reasonably rigid show better attenuation characteristics. Sponge rubber, cork, or a thin layer of felt produce definite attenuations, but even these materials do not reduce vibration by more than one-third, a figure corresponding with the findings of Agate and Druett (2). It is interesting to note that a thin layer of felt is better than a thick one and that plastic foam is worse than no cushioning at all. In a comparison between the two unaltered machines, the Model A with its rubber covered handle has slightly less violent vibrations than the Model B with its steel grip. It is not suggested that cork is a suitable material for everyday use — a much more durable material is needed — but it does give a lead for research and development by mining machine manufacturers. Suitable vibration-insulating material applied to the palmar surface of the miners' gloves would give additional protection. The application of vibration insulating material to the handles of drills used by a few miners with established Raynaud's phenomenon had no effect, with one exception, in preventing or delaying the onset of an attack. The exceptional case was of the opinion that the model A with the rubber grip did not induce attacks as readily as other makes of drill without insulated handles.

Another approach to this aspect of prevention lies in the manner in which many miners use the Jackleg drill. In an attempt to get the maximum footage out of the drill, the air pressure in the leg is increased to the limit, thus forcing the drill upward in addition to its forward thrust. Miners mistakenly believe that if they pull down on the machine to keep it horizontal, the pressure on the drill steel is further increased and more footage gained. Experience has shown this idea to be false. Correct pressure in the leg so that the drill remains horizontal will, in addition to providing the correct forward thrust in the drill steel, call for little guidance from the miner. In fact, once the drill is started, no hand guidance should be required. Education of the miners and training in correct use of the drill would reduce their vibration exposure to the time required to collar each hole and drill the first few inches.

If these measures are of no avail in preventing or delaying the onset of Raynaud's phenomenon and it becomes a serious health problem, it may be necessary to recommend the use of drills which do not have to be held or manually controlled while under power.

Discussion

It is suggested that environmental working temperature is of considerable significance in determining the onset of Raynaud's phenomenon. Alice Hamilton (3), in comparing the incidence of the disease in workers using pneumatic tools under different temperature conditions, observed the much lower incidence in men working in an indoor and heated environment. Lloyd Davies *et al.* (4) made a significant contribution to the knowledge of the etiology of occupational Raynaud's disease when they failed to detect a single case among men in Singapore dockyards using the same tools which had produced many cases in the British climate. The experience in the Saskatchewan mines tends to confirm the importance of fairly severe chilling of the hands as an etiologic factor in Raynaud's phenomenon of occupational origin. Pecora *et al.* (5) recently came to the conclusion that Raynaud's phenomenon of occupational origin was rare in the U.S. While agreeing with most of their deductions regarding its infrequent appearance, support cannot be given to the view that "The manufacturers of these tools have become aware of the pathologic effects and through research have improved their tools." They make no mention of environmental temperature as a possible etiologic factor. It seems possible that the warmer environment which usually prevails in American factories compared with European ones is an important preventive factor. Even in shallow mines in the U.S. mean temperatures are unlikely to approach the low levels which are found in the Saskatchewan uranium mines.

Over the years several accounts of occupational Raynaud's disease have appeared in the literature. In spite of this, there is considerable uncertainty as to the factors involved in its causation. Considerable differences of opinion have been evident as to the dangerous frequency, the figure varying from 2,000 to 36,000 vibrations per minute, with the most frequently incriminated vibration being in the 3,000 to 3,500 range. Until recent years our tools for the measurement of vibration have been crude, but now that adequate instrumentation is available it is most desirable to measure all the characteristics of vibration because frequency may not be the only factor involved in the causation of Raynaud's phenomenon, and a plea is made for this information to be recorded in all future studies of the disease in order that the influence of these factors may ultimately be determined. Mere information as to the strokes per minute is too crude if we are ever to ascertain whether or not specific ranges of these factors can be incriminated. It is only by such an approach that effective prevention measures are likely to be introduced.

Earlier writers have been almost unanimous in their view that the trigger mechanism is always cold. Our cases would suggest that, at least in the conditions under which the work was being undertaken, vibration was in some cases the main trigger, though in most cold alone was sufficient to trigger an attack.

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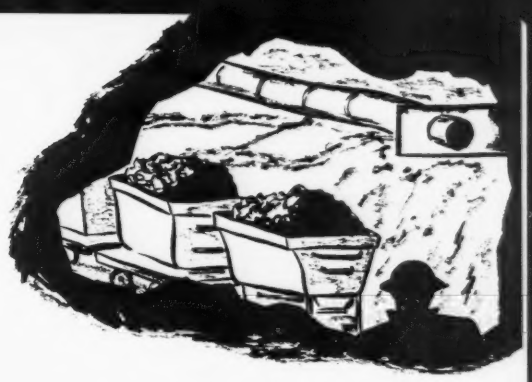

Protecting Health

in Mines and Tunnels

Minimum standards for control of health hazards in mining, tunneling, and other underground operations have been prepared by the Division of Occupational Health, Michigan Department of Health, in cooperation with the Division of Industrial Hygiene, City of Detroit. These standards fill the need of contractors, state and local governments and others involved in letting contracts for work in mining, tunneling, or other underground operations.

Figure 1. Two eight foot diameter axivane fans operating in parallel with 12 foot diameter discharge cones exhaust approximately 600,000 cfm of air through an 18 foot diameter, smooth-lined circular concrete shaft at this mine in Michigan's Upper Peninsula. (See Standard 1-1.3.) Michigan Department of Health's Division of Occupational Health has an experienced engineer stationed in the mining country who is available for consultation on health standards in mines upon request.

The minimum standards are sufficiently broad to provide effective health control guidelines to cover all types of work involving earth moving, both on surface levels and underground *in conditions of atmospheric pressure.* No attempt has been made to include mechanical safety standards, which, although very important, are not within the area of responsibility of the Divisions. While a considerable amount of work has been done by Detroit's Division of Industrial Hygiene on standards for working under compressed air conditions, this material is not yet available for publication.

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The minimum standards which follow will enable appropriate consideration, bidding and subsequent fulfillment of many requirements necessary to assure a non-hazardous work environment. Such items as control of air contaminants, respiratory protective equipment, ventilation, first aid, rescue work, and sanitary facilities have been covered in detail and in the references. An extensive list of related U.S. Bureau of Mines publications follows the standards.

These minimum standards have been carefully reviewed by representatives of the mining and other affected industries.

MINIMUM STANDARDS FOR HEALTH HAZARD CONTROL IN UNDERGROUND OPERATIONS INCLUDING MINES AND TUNNELS

Part 1—Projects open to outside (surface) atmosphere

1-1 Contaminant Control

1-1.1 General Ventilation Requirements

Clean outdoor air shall be supplied to all underground areas in a quantity sufficient to prevent the build-up of toxic dusts or gases to concentrations in excess of the Maximum Allowable Concentrations as annually listed by the Michigan Department of Health and to prevent the build-up of flammable gases to concentrations in excess of 10% of the Lower Explosive Limit. (See Tables I and II.) Special equipment and procedures for recirculating conditioned air may be approved.

1-1.2 Ventilation Rate — Minimum

1-1.2A Other Than Mines

The minimum air supply under any circumstances shall be sufficient to maintain the degree of control specified in Section 1-1.1 but under no circumstances shall the air supply rate be less than 200 cfm per worker, or 50 cfm per square foot of across sectional area through which air movement takes place, or 1200 cfm per drill, whichever is the greatest. In no case shall the air supply be less than 1500 cubic feet per minute.

1-1.2B Mines

The minimum air supply under any circumstances shall be sufficient to maintain the degree of control specified in Section 1-1.1. The design air flow rate may vary depending upon cross sectional area normal to air flow direction, number of workers, and operations being carried out.

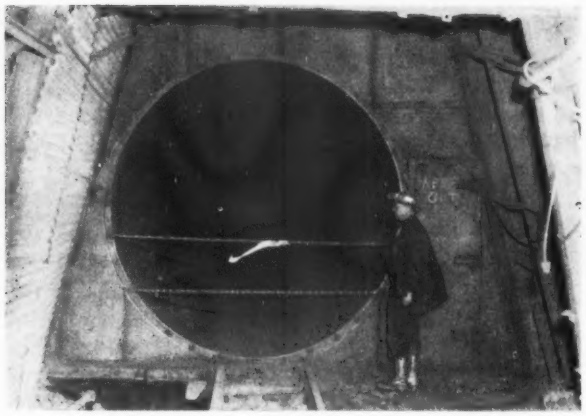

Figure 2. Main mine fan produces 124,000 cfm at this iron mine. Size of fan can be compared with the man at the right.

1-1.3 Ventilation Equipment

Fan or blower capacity should be sufficient to meet contaminant control requirements and it may be required that it be so designed and installed to enable reversal of gas flow when necessary. Fan or blower equipment including casings, air ducts, and fan houses shall be constructed of non-combustible material. Variance may be granted where equipment, such as flexible ductwork, is required for special purposes.

1-1.4 Ventilation Equipment Air Supply

The air supply shall be drawn from a relatively clean outdoor location and air cleaning equipment applied to the fresh air source where necessary. During the cold weather months the temperature of the air supplied at the working place shall not

TABLE I

MAXIMUM ALLOWABLE CONCENTRATIONS OF ATMOSPHERIC CONTAMINANTS

GASES AND VAPORS

Substance	M.A.C.
Ammonia	100
Arsine	0.05
Benzene (Benzol)	25
Butyl mercaptan	10
Carbon dioxide	5000
Carbon monoxide	100
Carbon tetrachloride	25
Chlorobromomethane ($CLBrCH_2$)	200
Ethyl ether	400
Ethyl mercaptan	250
Ethyl silicate	100
Gasoline	500
Heptane	500
Hexane	500
Hydrogen bromide	5
Hydrogen chloride	5
Hydrogen sulfide	20
Isopropyl alcohol	400
Methyl mercaptan	50
Naphtha (coal tar)	200
Naphtha (petroleum)	500
Nitrogen dioxide	5
Nitroglycerine	0.5
Ozone	0.1
Pentane	1000
Perchloroethylene (Tetrachloroethylene)	100
Phenol	5
Stoddard solvent	500
Sulfur dioxide	5
Toluene	200
Trichloroethylene	100
Xylene	200

HERBICIDES

Organic	
Sodium hydroxide	2.0
Sulphuric acid	1.0
Thorium	0.1
Trinitrotoluene	1.5

TOXIC DUSTS, FUMES AND MISTS

Substance	Mg/M^3
Ammonium Picrate	10.0
Antimony	0.5
Arsenic	0.5
Beryllium	.002
Cyanide as CN	5.0
Iron dust	10.0
Iron oxide fume	15.0
Oil mists	5.0

MINERAL AND NON-METALLIC INORGANIC DUSTS

Substance	M.P.P.C.F.*
Silica	
Quartz	
High (above 50% free silica)	5
Medium (5 to 50% free silica)	20
Low (below 5% free silica)	50
Cristobalite (above 5%)	5
Amorphous	20
Silicates	
Asbestos	5
Mica	20
Portland Cement	50
Soapstone	20
Talc	20
All Others	
Alundum (aluminum oxide)	50
Carborundum (silicon carbide)	50
Calcite	50
Dolomite	50
Dust (nuisance, no free silica)	50
Limestone	50
Marble	50
Slate (below 5% free silica)	50
Total dust (below 5% free silica)	50

—From Maximum Allowable Concentrations of Atmospheric Contaminants. MDH, 1960. This is a partial list. For M.A.C. of other contaminants, see complete list available from Michigan Department of Health.

*Million particles per cubic foot of air, standard light field count.

be less than 50°F. Variance may be granted where special repair work or rock temperatures make 50°F impractical.

1-1.5 Standby Ventilation Equipment

Where the air supply is necessary to keep flammable and/or toxic air contaminants to safe levels and immediate danger to workers would develop in the event of the failure of the ventilation equipment in use, standby equipment including an alternative power source must be available.

1-1.6 Noise Control

Wherever possible and practical pneumatic tools shall be equipped with individual mufflers to minimize noise levels in the work areas. Noise control equipment shall be applied to all other excessive noise sources. Ear plugs and ear muffs shall be made available to employees for use where necessary.

1-2 Monitoring of Work Area

1-2.1 Testing the Atmosphere

Where the presence of gas is suspected or anticipated the work area shall be tested at the beginning of each shift by a supervisory employee trained in the use of gas detection equipment. Equipment for the detection of all hazardous contaminants likely to be encountered such as carbon monoxide, carbon dioxide, oxides of nitrogen, hydrogen sulfide and methane and also for oxygen content shall be available, in good working order, and calibrated in accordance with the manufacturer's instructions and/or State Health Department requirements. Where necessary, in the opinion of the State Health Department, the atmosphere testing frequency shall be increased. All findings shall be appropriately recorded in a permanently bound log book.

1-2.2 Automatic Testing Equipment

The use of appropriately located automatic atmosphere monitoring equipment is required in work projects considered highly hazardous. An exception may be granted in writing by the State Health Department, depending upon the nature of the work being done and the physical characteristics of the work zone.

1-3 Respiratory Protective Equipment

1-3.1 General Considerations

All persons entering work areas suspected to contain excessive concentrations of hazardous air contaminants or being deficient in oxygen or doing routine monitoring of the atmosphere shall be equipped with United States Bureau of Mines approved respiratory protective equipment (list available from the Division of Occupational Health) specific to the contaminants possibly present. All respirators are to be maintained according to instructions in Appendix A.

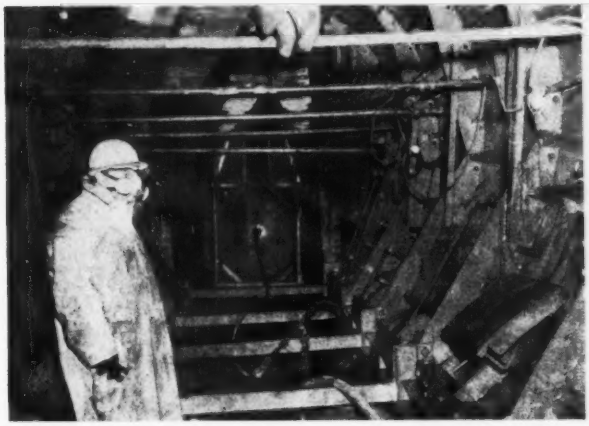

Figure 3. Forms for pouring concrete arches are shown in place in this tunnel. Note worker wearing approved respirator (Standard 1.3) to protect against hydrogen sulfide which is a problem in this tunnel. Air receiver is in the background.

1-3.2 Rescue Teams

Rescue teams instructed in the use of self-contained, oxygen breathing apparatus as described in the Bureau of Mines Handbook of that name, shall be available, equipped, and trained in accordance with Bureau of Mines circulars 33, 35 and 36. Variances may be granted in some instances, depending upon the character of the work being performed.

TABLE II

EXPLOSIVE LIMITS OF FLAMMABLE LIQUIDS and GASES

NAME	SYNONYMS	EXPLOSIVE LIMITS % BY VOL. IN AIR Lower	Upper
Acetylene	Ethyne; Ethine	2.5	80
Benzene	Benzol	1.4	8
Butane-n	Methylethylmethane	1.6	6.5
Butane-iso	2-Methylpropane	1.6	8.5
Butylene-n	1-Butene	1.7	9.0
Ethane	Methylmethane	3.3	10.6
Ethylene	Ethene	3.02	34
Ethyl Mercaptan	Ethanethiol	2.8	18.2
Formaldehyde (gas)	Methanal	7	73
Gas, Coal Gas		5.3	31
Gas, Natural		4.8	13.5
Gas, Oil Gas		6.0	13.5
Gas, Water		9.0	55.0
Gasoline		1.3	6
Heptane-n		1	6
Hexane-n		1.25	6.9
Hexane-iso		1	7
Methane	Marsh Gas	5.3	13.9
Pentane-n	Amyl Hydride	1.4	8.0
Toluene	Methylbenzene	1.27	7.0
o-Xylene	o-Xylol	1.0	6.0

—From Properties of Flammable Liquids, Gases, and Solids: Factory Mutual Engineering Division. 1950.

(In brief, the first of these publications covers types of approved respiratory protective equipment, construction, operation and test of oxygen breathing apparatus, care, maintenance, and use of self contained breathing apparatus. Circular 33 explains the source of mine gases, methods of detecting mine gases and the types of detectors, and laboratory equipment for analysis of mine atmospheres. Circular 35 takes up methods of protection against mine gases, including barricades, self-rescue equipment, gas masks, self contained oxygen breathing equipment, and treatment for gas poisoning or asphyxiation, including resuscitation.

Circular 36 covers procedure in sealing and unsealing mine fires and in recovery operations following mine explosions. It points out the importance of prompt rescue and recovery operations and provides detailed instructions for setting up and training a capable and efficient organization to carry on rescue and recovery operations after a mine fire or explosion.

Organization for training personnel and for handling mine disasters is classified as preliminary — the selection and training of officials and oxygen apparatus crews and the assignment of duties and procedures to be followed by local mine personnel in case of a disaster; temporary — organization of officials, oxygen breathing apparatus crews, and workmen connected with the mine at which the disaster occurs, with possibly some assistance from nearby mines, which immediately after a disaster carries out essential duties until the arrival of additional assistance; and permanent — the organization of all temporary personnel plus state mine inspectors, employees of the Bureau of Mines and others to function until recovery work is complete.

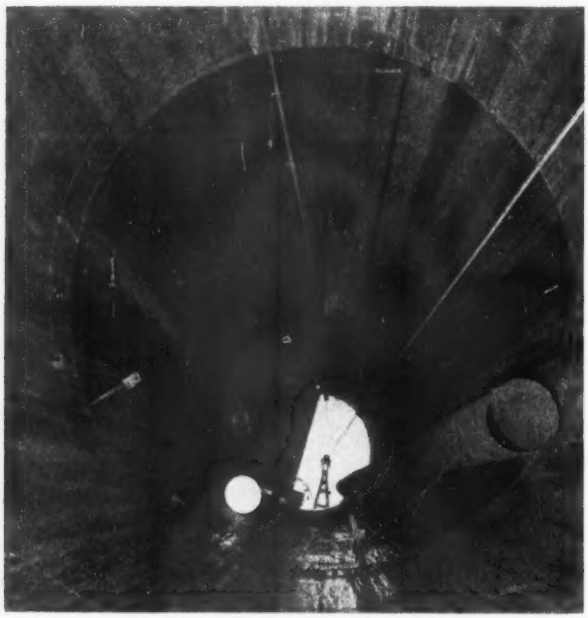

Figure 4. Looking up tunnel shaft. Air duct, right, is first equipment installed.

Circular 36 includes not only detail plans for organization, training, equipment, functions, responsibilities and duties, but also examples of how rescue operations were carried out in several mine disasters.)

1-3.3 Self Rescue Equipment

Because of fire or unpredictable atmospheric conditions in certain work areas, all employees shall be instructed in the use of the United States Bureau of Mines approved self-rescue type respirators and/or other appropriate respiratory protective devices. These devices shall be properly stored and available to all working places in sufficient number to accommodate the maximum number of employees underground at any one time.

1-3.4 Self-Contained Oxygen Breathing Apparatus

No workers, unless wearing a United States Bureau of Mines approved self-contained oxygen breathing apparatus, shall be permitted to work in a location where the oxygen content is less than 17% (safety lamp extinguishes at 15-17%), or where contaminant concentrations are suspected to exceed the recommended maximum capacity ratings of the filter type gas masks or respirators, except that no one will work alone under these circumstances.

1-3.5 Reduction in Atmospheric Oxygen

Workers shall not be permitted, except in *extreme emergencies,* to work continuously in a place where the oxygen content of the air is less than 19% by volume (dry basis).

1-3.6 Respirator Maintenance

Periodic maintenance and cleaning of respirators shall be done at a central area. Where this is the responsibility of the individual wearer, maintenance and cleaning shall be carefully supervised. (See Appendix A.)

1-4 Drilling and Blasting

1-4.1 Wet Drilling

When drilling holes in rock or concrete, wet drilling equipment must be used. Variances may be granted depending upon the physical characteristics of the work area, material being drilled and the equipment used.

1-4.2 Wetting Muck Pile

Where dry rock or other material is being handled, the muck pile shall be wet down prior to

mucking and kept wet during the mucking operation in order to control dust. Where water may have a harmful effect on the material being worked, other means of dust control may be used.

1-4.3 Water Spray During Blasting

A high pressure water nozzle system shall be used near the face at the time of blasting to help control the dust produced by the blast. The nozzle system should be designed to provide a curtain across the tunnel close to the face being blasted. Variances may be granted depending upon the physical characteristics of the work area and material.

1-4.4 Blasting Gases

Sufficient time, at least 30 minutes after blasting, shall be allowed for the concentration of blasting gases to be reduced to safe levels by the ventilation system. In dead end drifts in mines and in tunnels, the ventilation systems should be designed to effectively exhaust blasting gases and other contaminants.

1-4.5 Air Supply and Exhaust Duct

The supply air duct should terminate as close as possible to the working face and the exhaust air duct extend to a main exhaust airway. The inlet of both ducts must overlap sufficiently to prevent recirculation. Approval may be granted for single duct systems in certain types of work.

1-5 Communication System

1-5.1 Signaling Devices

A Bureau of Mines approved telephone system shall be maintained at all times to give instant communication between each underground level and the surface. The signaling apparatus shall be kept in good order at all times. Where distances are short and communication can be readily carried out by other means, an exception to the telephone system requirement may be granted. In addition, an approved signal system must be maintained between the hoist room and all levels and it should further enable personnel to signal the hoistman without getting off the cage or other man-carrying device.

1-6 Sanitation

1-6.1 Toilets

Operators shall provide dry closets, water closets, chemical closets or closet cars adjacent to all working areas for the use of employees in accordance with the following schedule:

For 1-9 employees	**1 unit**
10-24 employees	**2 units**
and 1 unit for each additional 25 persons	

Ready means of access to each such closet shall be provided by the operator. No closet shall be constructed without adequate provision for the effectual cleansing and removing of the contents thereof, which shall be removed and disposed of at regular intervals.

1-6.2 Drinking Water

The operator shall either provide a sufficient quantity of potable drinking water in portable sanitary dispensers at convenient locations for the use of all employees, or install drinking fountains on each level, or provide canteens which employees can fill at the start of each shift and take to the work place. It shall be the duty of a supervisory employee to protect such supply of drinking water from contamination.

1-6.3 Wash and Change House

Each operator shall provide a wash and change house. Such wash and change house shall be adequately heated and lighted and shall contain a sufficient supply of hot and cold running water, hot and cold showers and washbowls. In addition, adequate facilities must be provided for drying work-

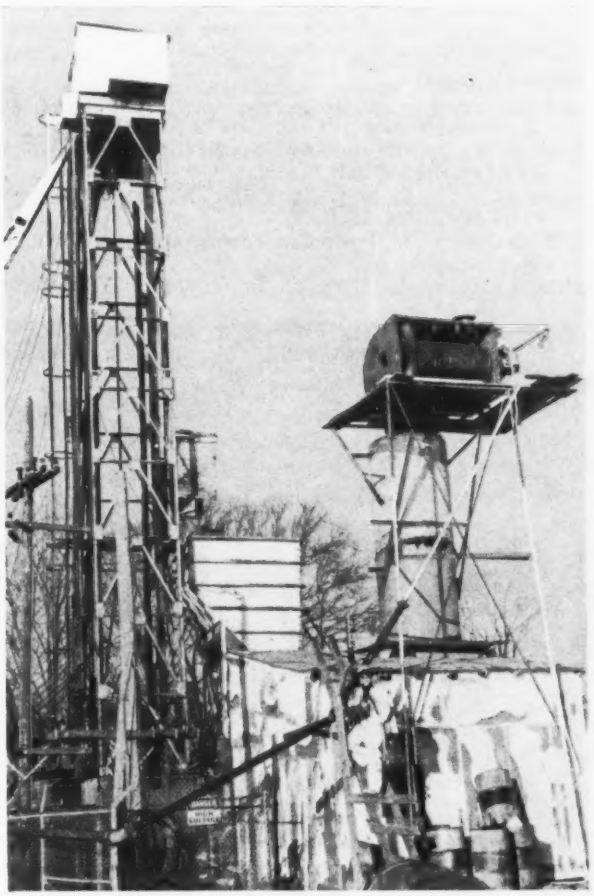

Figure 5. At ground level, tunnel shown in figure 4 looks like this. Note heater on the air intake muffler (Standards 1-1.4, 1-1.6) Fan operates at 14,300 cfm.

clothes during off hours and for storing street clothes while employees are below ground. Sanitary facilities in change houses shall be in accordance with the Michigan Standards for Industrial Sanitation, Michigan Department of Health.

1-6.4 Cleanliness

Care should be taken to keep all active underground areas and adjacent buildings including change rooms, restrooms, and storage spaces in a sanitary condition and free from refuse, decaying or other objectionable matter and vermin and rodents.

1-6.5 First Aid

Suitable facilities (See Appendix B) shall be made available for the immediate care of the injured or acutely ill workers. At least one designated trained first-aid worker shall be available during all work periods.

1-6.6 Arrangements shall be made to have a physician available on call in case of emergency. The hoisting engineer and shift foreman are to be responsible for knowing where the doctor can be reached at any time.

REFERENCES:

Bureau of Mines

Bulletin 385, *Engineering Factors in the Ventilation of Metal Mines* (1935)

Bulletin 589, *Introduction to Mine Ventilating Principles and Practices.* (1960)

Miner's Circular 33, *Mine Gases and Methods for Detecting Them.* (Rev. 1954)

Miner's Circular 35, *Protection Against Mine Gases.* (Rev. 1954)

Miner's Circular 36, *Procedure in Sealing and Unsealing Mine Fires and in Recovery Operations Following Mine Explosions.* (Rev. 1948)

Self-Contained Oxygen Breathing Apparatus. (1941)

Michigan Department of Health

Revised Respirator List (1958)

Michigan Standards for Industrial Sanitation. (1956)

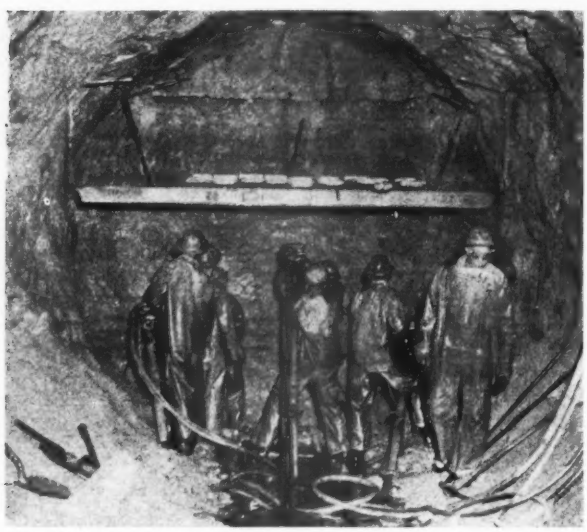

Figure 6. Drilling at the face of the tunnel in gas laden atmosphere requires that every worker wear an approved respirator. A list of approved respirators for all kinds of hazardous environments is available from the Division of Occupational Health.

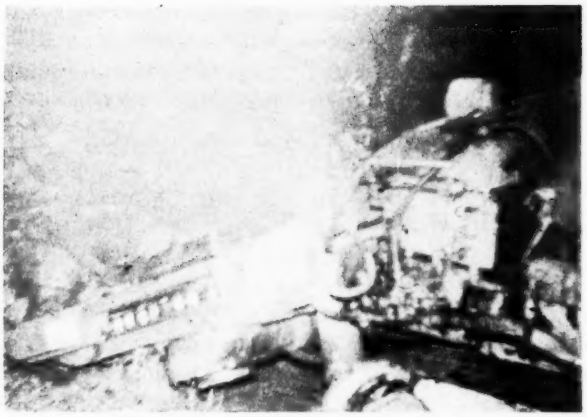

Figure 7. Water fog nozzles wetting down ore pile. (Standard 1-4.2) Mucking machine shovels up ore to a shuttle car with dust hazard controlled by fog nozzles.

ADDITIONAL READINGS:

Bureau of Mines

Federal Mine Safety Code for Bituminous-Coal and Lignite Mines of the United States. Part 1 — Underground Mines. (1953)

Miner's Circular 51, *Injury Statistics as an Aid in Preventing Accidents in Metal and Nonmetallic Mines.* (Rev. 1958)

Miner's Circular 52, *Accidents from Falls of Rock or Ore at Metal and Nonmetallic Mines.* (Rev. 1955)

Miner's Circular 53, *Accidents from Hoisting and Haulage at Metal and Nonmetallic Mines.* (Rev. 1955)

Miner's Circular 54, *Accidents from Explosives at Metal and Nonmetallic Mines.* (Rev. 1956)

Miner's Circular 55, *Fires, Gases, and Ventilation in Metal and Nonmetallic Mines.* (Rev. 1955)

Miner's Circular 56, *Electrical and Mechanical Hazards and Falls of Persons at Metal and Nonmetallic Mines.* (Rev. 1955)

Miner's Circular 57, *Health and Miscellaneous Hazards at Metal and Nonmetallic Mines.* (Rev. 1957)

The above seven publications constitute the textbooks for a course in Metal and Nonmetallic Mine Accident Prevention.

Appendix A

MAINTENANCE OF RESPIRATORS

The failure of personal protective devices to perform satisfactorily is attributable in many instances to neglected or inadequate maintenance. To obtain satisfactory performance, one person should be assigned to service respirators regularly, and a place provided for the repair, cleaning, and storage of respirators and replacement of parts. The steps that should be taken in servicing respirators are as follows:

1. Dismantle respirators completely and discard parts which are defective.
2. Soak parts, except filter cloths, cartridges and canisters, in warm soapy water.

3. Scrub each part thoroughly with a suitable brush, and rinse in hot water.
4. Further treatment is usually not necessary but in cases where such is desired, remove elastic head bands and dip the other washed parts in 70% isopropanol (iso-propyl alcohol) or ethanol (ethyl alcohol). (If other germicidal solutions are used, including denatured alcohols, all treated parts must be rinsed several times in clean water immediately after treatment, as skin irritations may result from allowing such solutions to dry on the parts.)
5. Place all washed parts on a clean cloth or rack in a well-ventilated dust-free place to dry.

CAUTION: Alcohol vapors are flammable

6. Replace filter papers and defective parts with new parts; rap or blow dust from permanent cloth filters, and reassemble respirators. Remove seals from cartridges and canisters at time of issue — not before.
7. Inspect assembled respirators to see that valves function, and that parts have been properly assembled.
8. Store respirators in clean individual dust-tight containers when not in use. Cellophane or plainly marked paper bags may be used.

Appendix B

MINIMUM REQUIREMENTS FOR FIRST-AID FACILITIES IN MINES AND TUNNELS

Each working level must have suitable facilities available for the immediate care of injured or acutely ill workers. The requirements here described are minimal. Additional provisions may be required in establishments where unusual or extensive problems exist.

The following requirements for first-aid facilities and personnel are obligatory in every work place:

1. Establish a definite plan of procedure in case of accident or acute illness. Record this plan on an "In Case of Accident" placard and post it conspicuously at the First Aid Station. In accordance with 1-6.6, a physician must be available on call and directions for obtaining medical aid should be included on the "In Case of Accident" placard.

II. Provide an adequate first-aid kit, properly located. The kit should not be locked and must be conveniently located and available. First-aid equipment must be kept in a dust-tight, durable case and near handwashing facilities. It shall be the duty of someone in a supervisory position to see that adequate first-aid supplies are always on hand.

The first-aid kit shall contain at least:

1. Sterile, individually wrapped 3" x 3" gauze pads (6 to 12).
2. Sterile, individually wrapped pressure pads at least 6" x 6" (2). These are to be used for pressure dressings for large bleeding wounds. Sterile gauze one yard square or five yards square, will serve the same purpose and may be more easily available.
3. One-inch and two-inch gauze bandage rolls.
4. Small ready-made adhesive bandages (package or box).
5. Burn preparation.
6. Wound antiseptic (e.g., mercresin, metaphen, merthiolate, zephiran, etc.) It is recommended that these be ordered in individual swabs. Consult your physician for specific instructions concerning all medications and treatments.

In addition, the following items may be useful: Roll of one-inch adhesive tape, triangular bandages, a tourniquet, scissors, safety pins, paper drinking cups, individually wrapped applicators, small forceps, eye-wash solution, sterile eye droppers, 2% acetic acid, bicarbonate of soda for burns, aspirin, aromatic spirits of ammonia, stretcher, and boards for arm and leg splints, dependent upon the operation. A ledger or notebook in the first-aid kit, for the purpose of recording the type of first-aid treatment, is recommended.

III. At least one designated trained first-aid worker, whose name shall be posted on the "In Case of Accident" placard, shall be readily available during all work periods when there is no registered nurse or physician on duty.

Trends in EMERGENCY CARE

By J. C. DICKISON, M.D., C.M., F.R.C.S.(C)
Drummond Medical Building, 1414 Drummond Street, Montreal, P.Q.

It is a pleasure and an honour for me to be invited to present an address to your group. It will be my intention to define for you in a clear manner the condition of shock, the principles of the treatment of this condition, the arrest of hemorrhage, the splinting of injured parts and the present day care of wounds.

Although there are many advances in the technical understanding of the bodily processes which occur in the condition of shock, the basic condition is, in my opinion, easily explained, and when understood, the importance of various types of supportive care by the attendant to an injury will then become apparent.

Firstly, let us separate primary shock from secondary shock. Primary shock is the condition which occurs when Auntie Mae hears some bad news or sees some blood or feels some pain such as a needle. This is neurogenic. The subject just collapses and falls unconscious to the floor. This condition is caused by a sudden release of the normal vasomotor tension throughout our system. By this I mean that all our blood vessels have pressure within them. There is a tone to the vessel wall and that is basically our blood pressure. In the upright position if there is a sudden release of this tension through all the vessels of our body, then by simple gravity there is a pooling of the available blood in the more dependent portions of our body and there is an almost immediate lack of supply against gravity to the blood vessels of the brain. Nature's method of treating this condition cannot be improved upon in that as long as the patient will lie horizontal so that the feature of gravity is eliminated the blood supply will soon find its way to the brain and in a few seconds the patient will regain consciousness.

The basic feature of secondary shock, or traumatic shock, or the common type of condition which exists when we say a patient is badly shocked, is quite a different matter. In primary shock the basic feature is the neurogenic control of the tone of the blood vessels which is a closed system of vessels containing a certain amount of fluid. In secondary shock the basic feature of the condition is an inadequate amount of circulating fluid in the blood vessel system. Take a simple toy balloon and fill it with water and then squeeze the balloon with one hand, let the hand relax and the level of water in the balloon will drop. This is primary shock. Take the same balloon and with a needle put a couple of holes in the bottom of the balloon, the level of the water will drop but for a totally different reason. This is secondary shock. Secondary shock, if untreated, in many cases will progress to a degree where it will result in death.

At this time I want to make it clear to you how very much can be done by the nurse or by any attendant to a patient who is in shock. Let us take a patient with a compound fractured femur and explain this condition of shock. First of all, there is a lot of local blood loss, whether it is a compound wound or not, and this local loss of blood volume will initiate the condition of shock. Mother Nature immediately will clamp down or increase the tone of peripheral blood vessels and cause them to clamp down so that she can save all available blood for the vital organs such as the brain and the liver. Therefore, a patient in shock has a very limited blood supply going to his skin and as a result his feet are clammy and cold and he complains of being cold. If exposed to adverse elements, such as rain or cold, he is unable to properly defend against them. When there is an inadequate circulating blood volume, the heart rate will increase in an effort to try to keep the pressure up to an adequate level for proper function of the various vital organs. The pulse rate is an extremely valuable clinical indicator of the progress of the shock condition. The patient in shock is terribly alert. Many people think that a patient in shock means an unconscious person, and here they are not understanding the difference between primary shock and secondary shock. They are characteristically agitated, extremely upset and have a fear of im-

**An address to members of The Occupational Health Nurses of Ontario and Quebec, June 1st, 1961, Ottawa, Ontario.*

pending disaster. One more item in the clinical picture is that, in most cases, the pain from the local injury, be it a burn or a compound fracture or other severe injury, rapidly increases their agitation as it becomes more and more difficult to bear. In mentioning burns, the process of shock remains the same except, of course, there is not a loss of whole blood. However, there is such a tremendous loss of fluids in a large burn, which go into the burnt area, that again there is the development of an inadequate circulating blood volume. In a similar manner, a patient with a fulminating gastroenteritis with diarrhoea and vomiting can go into shock when inadequately treated because of fluid loss, and therefore, blood volume loss.

All these processes, if unarrested, will soon swing into a vicious circle resulting in loss of life. This vicious circle can be attacked in many places and the obvious most effective place would be the restoration of circulating blood volume in direct manner by blood transfusions. When blood is not available plasma would be the next most reasonable replacement. Failing this, plasma expanders of synthetic construction are the next best.

But there are so many other things that can be done in the emergency sense and any one thing may be the point where the progress of the shock condition is arrested. a) I would suppose that the most important point of all is for a person to arrive on the scene and rapidly disperse all the element of panic in the situation. For a badly injured person to find someone arrive, quite naturally initiate steps to arrest hemorrhage and dress wounds, and in an orderly fashion arrange and organize all available help to lead the injured patient to definitive care, — this is the one thing that I would choose if I had but one choice should I ever receive a serious injury. Naturally, two people cannot take command of one situation and there again the smart person will rapidly size up a situation and make her decision that she must be the number one helper, or must take over command. I am quite sure that there are many ladies in this group who are thinking of occasions where they were not in a position to take charge of an emergency but only wished to heaven that they were at the time so that things could be done more efficiently! On a couple of occasions I have arrived in a house where the minute I walked in I could sense the element of panic present. Everybody running around in purposeless fashion, themselves getting more and more excited and their efforts becoming more purposeless. This situation caused the death of a lady in Montreal seven or eight years ago when this particular lady bumped her shin against a piece of furniture and broke a varicose vein. There were four other people in the house but in their hysteria and panic associated with the visible blood loss, not one of the people thought of putting a finger on the rupture varix to stop the blood, and this lady when she was finally taken to a nearby hospital had progressed beyond the point of return from blood loss and died. On the few occasions when I have sensed this situation and have sensed it proper to take control, I have immediately got everybody doing something. Send grandmother into the kitchen to boil some water. Send grandfather down to the drug store to get some dressings. Send the other people — give them all a job to do, and immediately one will sense the return of reasonable thinking and rational care of the injured.

b) The patient needs protection from the elements and warmth. You are all aware that the First Aid teaching is so ingrained into the public now that patients must be splinted where they lie. If this situation happens to be in the pouring rain in the middle of a highway, there is going to be more than one person killed if the patient isn't moved. After being protected from rain or snow, then they need blankets to protect their body heat, which mechanism is severely disturbed by the lack of superficial blood. The warmth and comfort of a cup of tea for a conscious patient who is injured in his extremities can be a tremendous feature in the general support of an injured patient. A word of praise for the Red Cross tea wagons is in order, and I am particularly reminded of the tremendous service carried out by these people in Britain during the War. Time and experience have proven beyond any doubt the value of this method of combatting progressive shock.

c) The arrest of hemorrhage. Ninety percent of bleeding can be arrested by the use of local pressure, and I include compound fractures in this statement. Again the public belief will come to the fore in that a tourniquet must be applied, and is frequently applied before even local pressure is attempted. Free bleeding demands urgent care but not that urgent that proper reasoning is thrown out of the window. I would remind you of the process of giving a blood transfusion where in about five to seven minutes approximately 350 cc. of blood are drawn and after another few minutes, as most of you know, one is able to walk away with no after effects. It has been one of my hobbies as a citizen to give blood donations rather regularly and my next transfusion is to be my 26th. I cannot honestly remember any ill effects from any of these donations. As a matter of fact, the one thing that I really do hate in the process of giving a blood transfusion is tearing off the bandaid from

my hairy forearm later on that day! I mention this only to make you realize that the body can accommodate very well to a rather considerable loss of blood, given the proper conditions. One condition must be that this loss is arrested. A second condition is that there should be no fear, pain or discomfort associated with it. After the last War it used to be commonly stated that there were more limbs lost from the use of a tourniquet than were saved. This happens because a tourniquet is not applied with enough pressure to occlude the arterial inflow to the limb, and I had the good fortune of seeing this demonstrated in its entirety one day some years ago when I got into an elevator in the hospital with a man who was obviously in shock. He was on a stretcher with a blanket over him. I raised the blanket and saw his leg with a compound fractured tibia lying in a pool of blood in the stretcher. I did not know whose patient he was or where he came from but I ordered the elevator operator to take the patient right to the operating room floor. We went into the operating room and one could see the blood welling out of his compound tibia. I immediately released the tourniquet which had been placed above his knee, and the bleeding stopped. When a tourniquet has to be applied it must be applied to obliterate the distal pulse, otherwise you are allowing blood to get into the limb and you are obstructing the venous return and causing a marked increase in loss out through the wound site. In an emergency situation any material will suffice, even if it has to be your bare fingers, to apply pressure to a wound. There is but a rare hemorrhage which will not stop with the application of one or two crepe bandages at the site, if these are available.

d) Pain is another site where the progress of shock can be attacked. If sedation is available, so much the better, but more important is the splinting of injured parts. A splinted wound or a splinted fracture soon relieves the great part of the local pain. I hope to have the time to demonstrate the equipment I keep in my car, which is available for anyone, and this consists mainly of some St. John's triangular bandages and some crepe bandages. For any injury to the upper extremity, if that extremity can be fixed to the body, it provides very satisfactory splinting and immobilization. Similarly, when nothing else is available, the best splint for an injured leg is the sound leg, and the two can be bound comfortably together.

e) The air way. To place a discussion of the air way last fits only the saying "last but not least". In approaching any unconscious patient establishment of a proper air way is the number one consideration. No matter how much a limb is bleeding the air way takes precedence. And here I would like to start a little discussion on snoring. Due to the mechanical arrangement of the muscles of our tongue, when we are deeply unconscious our tongue will fall back and obstruct the inlet of air into the larynx. This is snoring, and only occurs in reasonably deep sleep when the muscles of the tongue become relaxed and when we lie in a position that the tongue will fall back. In an injured person their tongue will fall back if deeply unconscious, and I have seen the situation on one occasion where a man was lying on his side, deeply unconscious, with a broken leg. The leg was well-splinted, the patient was placed on a stretcher on his back, shoved into the back of an ambulance, and by the time he got to the hospital the attendants were most surprised to find him dead. I think it is obligatory to have available tongue depressors and, in particular, the modern resuscitube which can also be used for mouth to mouth artificial respiration, but can be used as a simple air way if this is all that is indicated.

How does the casualty doctor want you to treat a wound? Once again we must attack the public belief that because a patient gets a wound they should have iodine poured into it to kill any bugs. In particular, this is so wrong when one handles a clean wound that has occurred in a kitchen, or by a knife in some other situation, and which is going to demand definitive treatment by surgery. I think most casualty surgeons will agree with me in urging you not to pour medicines into a wound which is going to get its definitive care in a very short period of time. A wound should be covered and supported and splinted by a dressing as soon as is possible. This is to prevent any further contamination of the wound, because a great majority of wounds are infected by mouth-borne organisms and a wound which is left exposed in front of a lot of people talking has a great risk of developing infection. A wound properly covered can then be examined by the casualty doctor and a decision made as to whether its care can be carried out with local or general anaesthetic, and at operation the surgeon will do the necessary cleansing of the wound according to his judgment. Antiseptics in most cases will only increase the pain and increase the cell destruction and in that sense preclude good primary wound healing.

In similar fashion a burn should be covered as soon as is possible. Whether or not the surgeon chooses to treat this wound definitely in an open method does not change this fact. In the emergency sense, get the wound covered, with sterile

material if possible, but if not, the next best thing, and this will also provide splinting which will alleviate the pain resulting from the burn.

The use of anti-tetanus drugs I believe should be mentioned. One is so often confronted with the question "Should I, or should I not bother with measures to protect the patient against tetanus?" Having seen three or four cases of tetanus, there is no longer a problem in my mind. Fortunately nowadays the need for anti-tetanus serum is rare because children have their immunity developed with toxoid. Ex-service people have their immunity developed in similar manner, and the dangers of the administration of horse serum do not come into the picture. In my own practice, whenever I consider whether a patient should or should not have support against tetanus, I arrange that they get either a booster dose of the tetanus toxoid, if they have had previous toxoid, and if not, a course of three injections of the toxoid.

I have been particularly asked in this paper to give some information with reference to blunt injuries to the body. This would imply potentially serious injuries with no visible external evidence.

Blunt injuries to the chest causing serious injury will in practically all cases cause extreme respiratory embarrassment and will obviously lead to a demand for early definitive care. The lungs may be lacerated because of their fixation; the trachea and bronchi can occasionally be lacerated. The lesions are catastrophic in nature and in evidence.

Blunt injuries to the abdomen centre about rupture of the spleen, rupture of the liver, and rupture of one or more of the hollow organs. Rupture of the liver or spleen may appear mainly as a lower chest injury. An efficient method of getting rid of an enemy in the Mediterranean area, as still practiced, is a sharp blow over the 9th, 10th and 11th ribs left side posteriorly, which will in all probability cause a rupture of the spleen. Hemorrhage within the abdominal cavity can be extremely difficult to diagnose, but the condition must be kept in mind when people report injuries of the blunt type to the abdomen. People who have a serious injury will, on the average, look sicker, in that the protective mechanisms, as mentioned before, will be commencing to take over, or will already be taking over, and they will be present with varying degrees of shock, exhibited by pallor, rapid pulse, thirst, etc. The dangerous ones are, of course, the ones presenting a minimal number of these signs, but I can only repeat that people with blunt injuries to the abdomen must be watched very carefully and particularly advised to report any untoward symptoms should they be discharged from your care. Obviously, it would not be practical to admit every case of blunt trauma to the abdomen to hospital for observation for 48 hours, and the judgment must come based on the above clinical signs and the patient's general appearance.

In summary, I would urge attendants to accident cases to think in terms of how very much can be done for an injured patient, apart from definitive care, rather than how little can be done. The features of the airway, the arrest of hemorrhage, the dressing of wounds, the splinting of injured parts, the protection from the elements, oral hydration when possible, have all been listed in this paper. To conduct these first aid measures in rational sequence and with satisfactory results demands the most important thing of all, — a sound mind which will not entertain panic at any time in any situation.

OCCUPATIONAL HEALTH IN EUROPE

By T. H. PATTERSON, M.D., C.M., D.P.H., M.P.H.

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During the last century, industrialists became increasingly aware of the need for measures to protect the health of their workers and began to introduce some of these improvements. As these measures proved successful, legislation was introduced to ensure their wider implementation and further extend this protection.

The objectives and purpose of occupational health services as we know them today are essentially the same in all countries. There are, however, basic differences in the methods of implementation, extent of service, and financing, in order to fit these services into the social, economic and professional pattern of the various countries concerned.

In Europe, there has been a tendency to legislate for health services, more so than in Canada, but this attitude did not come about all at once. It has developed over a period of two centuries, as we see particularly in Great Britain. Legislation is not consistent in all countries and varies from dealing with only basic needs in one country to an attempt to deal with almost every possible situation in another. In some instances, one gets the impression that the country concerned has little or no confidence that any improvement in working conditions will result unless legislation is passed to enforce this improvement. In other countries, however, even in cases where fairly extensive national health services already exist, it is recognized that the development of occupational health services is best carried out with a minimum of government interference. Governments themselves have sometimes been forced to recognize this while attempting to place national controls on this service.

A particularly knotty problem has deterred the development of nationalized occupational health services by the mere fact that industry's demands on such a service vary a great deal. Certain types of industries, due to their size and hazardous working conditions, require extensive and comprehensive occupational health services while others require only a minimum of service. Any attempt, therefore, to develop a comprehensive national occupational health service is eventually faced with providing too little to those industries and workers who need the most and too much to those who need the least, to the dissatisfaction of everyone concerned. Generally speaking, most European countries have fairly extensive national health services, which meet most of the needs of the population for diagnosis and treatment. The major part of preventive services is also under the direction and supervision of government departments such as that of Social Affairs, Labour, Mines, and Fuel and Power.

It might be pointed out here that industrial health services began in Europe long before the development of public health services, for with the onset of industrialization the health, safety, and welfare of workers became a serious economic consideration to industrialists and nations alike. Hence we saw the early growth of legislation directed toward the protection of workers for the purpose of ensuring minimum standards. Along with this development inspectorates were set up to enforce regulations. From the very earliest days in most European countries, factory medical inspectors have been appointed, along with other specialized inspectors in the engineering and other technical fields. The medical inspectors at the federal level usually act as advisers or consultants to industry and government. They assist with the drafting of legislation and carry out special investigations into working conditions. The medical inspector working at the state or local level carries out more detailed duties within the industries themselves by inspection and supervision of health and working conditions, and they are responsible for medical examinations and re-examinations of young workers and those employed in hazardous trades. These government-appointed medical inspectors at various levels, although they may in some countries do limited diagnoses and treatment of occupational disease, are primarily responsible for the preventive aspects of occupational health.

In some of the countries with highly developed social services, the general practitioner type of physician provides all the clinical, diagnostic, and treatment services to workers and general population alike. He co-operates with the medical inspectors, and in several countries is required by

**An address presented at the Third Occupational Health Conference in Vancouver, British Columbia, February, 1960.*

law to report all or most occupational diseases or injury cases.

In most European countries, as in Canada, the very large industries provide their own voluntary occupational health services for employees. They also provide much the same range of service as we have. Many smaller plants provide part-time services, and in several heavily industrialized areas comprehensive occupational health services are provided to a large number of industries of all types and sizes through specially developed industrial health organizations. The Slough Industrial Health Service in England is a good example of this type of organization.

In the development of occupational health services everywhere, the need for co-ordinating all the many interested organizations becomes of paramount importance. The health of the working population becomes the concern of Departments of Health, Labour, Social Affairs, Mines, local governments, the medical and nursing profession, management, and labour; and the efforts of each of these may become wasted if not integrated with the others. In several European countries, responsibilities in occupational health are shared by many services and there is a lack of uniformity in their administration, but this is not always the case.

Norway, although a rather small country population-wise, provides an interesting approach towards solving this problem. Here, where the major part of the preventive services are under government direction and control and health insurance covers most of the population, voluntary occupational health services also flourish. Through a tri-partite agreement between the Norwegian Employers' Association, the National Federation of Trade Unions, and the Norwegian Medical Association, 100% of plants with 500 or more employees are covered and more than 10% of those plants with 5 or more employees are also covered. The service here provides pre-employment and periodic medical examinations, supervision and inspection and advice in the plants for all health problems, treatment for acute and minor conditions. The physicians appointed in this service report occupational diseases to the factory medical inspector and co-operate with these inspectors in the correction of any occupational health hazards.

This development in Norway would appear to lend support to the findings of the Commission which was set up in Great Britain to look into the possibility of duplication of services being offered by the occupational health services and the National Health Service. Excessive demands were being made on medical and nursing manpower in the country because the National Health Service Act and the expansion of industrial health services came about simultaneously, and it was hoped by some that these two services would be combined under one head. However, many were pleased with the report of this Commission in that it gave official recognition to industrial medical and nursing services and even expressed the opinion that these services had treatment as well as preventive responsibilities. It went on to state that the incorporation of this service into the National Health Service would adversely affect the development of industrial health services. This statement was made in the Commission's report: 'These services, which may now be regarded as a normal function of enlightened management, are important to industry by reasons of the contribution they make to the health of the worker and productivity.' The report also positively denied the existence of any duplication of service.

One of the most impressive developments related to occupational health in Europe is perhaps that of the attitude toward training in this field. Not only is special occupational health training given to doctors and nurses at the undergraduate and postgraduate level, but quite extensive training is offered and may even sometimes be compulsory for engineers and other technical personnel in their undergraduate years. Special training in occupational health is also offered in several countries for representatives of management. In some instances, compulsory or voluntary training courses exist for foremen or shop supervisors. When I mentioned engineers previously, I did not refer to the type of engineer which we in this country recognize as the industrial hygiene engineer who is specialized in this particular field, but to all types of engineers who may eventually find themselves employed in industry. In some of these countries, engineers and other non-medical professional students receive more than 25 hours of undergraduate training in occupational health. This exceeds the training we give our medical undergraduates in Canadian universities.

The reason for this is that there is a growing recognition in some of these countries that occupational health knowledge when placed in the hands of engineers, management, technicians, and foremen or supervisors in industry, results in the development of working methods and in the application of production techniques which are designed not only to improve production but also to protect the health of workers. I think all of us in the occupational health field will admit that there is already a wealth of knowledge in this discipline which, if placed in the proper hands, can be applied to improve working conditions and production in industry.

To sum up, it can be said that, in the development of occupational health services in Europe, they have been recognized as a separate and distinct entity among the health services, and that even in those countries where health services have become nationalized, there is a definite and assured place for voluntary occupational health services. These are provided by industry and are continuing to expand. They are, for the most part, quite well integrated with government-directed preventive services. The inspecting systems in European countries employ specially trained medical inspectors as well as inspectors with engineering and other professional qualifications.

True, there is a tendency to legislate excessively on matters of health to provide basic minimum health services but, where legislation is not restrictive, private industry has shown a growing interest in providing comprehensive occupational health services which are directed towards improving the health and working conditions of employees beyond the levels prescribed by law.

In the matter of training or teaching, European countries have placed greater emphasis on giving occupational health training to all doctors and nurses, and perhaps even more significant is the fact that some of these countries give this training to engineers, technicians, management, and foremen as an important part of their preparation to operate in industry. This is indicative of the increasing value industry places on the health of employees, and a greater effort is now being made to adapt work to man and each man to his job.

Special organizations or institutes are developing in these countries to do research into the problems of occupational health, and here the researcher is being brought into close contact with the actual industrial conditions, so that the results of this work have practical application to industry. This means practical application not only of the results of new research work but also of the knowledge which we already have in this field, and utilization of this knowledge is enhanced by the inclusion of occupational health training in the training programs of most key industrial personnel.

In short, knowledge of occupational health problems is greater than the means for disseminating such knowledge, because of the lack of teaching facilities and trained personnel. As a result of this, the information is not in the hands of physicians, nurses, engineers, managers, and so on, who are the people who can put this knowledge to use directly in industry.

Although efforts are being made to meet the teaching needs, research is continuing to proceed at a rapid pace. All the advanced European countries have one or sometimes several occupational health research institutes. These institutes, although they may be financed partially or even wholly by government funds, are autonomous and maintain a very close relationship with industry. Many are also closely associated with universities, and their staff is actively engaged in teaching as well as research. In recent years, these institutes have tended to concentrate on the investigation of problems of ergonomics, or human engineering, and the results of this work are having significant effects on health and production of workers.

As mentioned in the beginning of this talk, I intended only to touch briefly on a few observations of the practice and attitudes of occupational health in Europe. I have not attempted intentionally to draw comparisons between European countries, for these services may range from poor or non-existent in one country to excellent in another. Nor have I intentionally compared even the best European practices with those of our own countries. I have pointed out, however, one or two areas which, I personally think, represent advanced thinking in the field of occupational health and are worthy of close scrutiny of everyone interested in improving the health of our working population.

Alcoholism in Industry

DETECTION
PREVENTION
CONTROL

By *IRENE KINGSTON, B.A.,*
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"Kings are blest, but Tam was glorious,
O'er a' the ills o' life victorious."

A Cotter's Saturday Night — ROBERT BURNS.

In the industrial and social life of today, thousands, faced with the complexities and hurly burly of living, turn to the bottle to assuage their mental thirst for relief from the "ills of life" which beset them. But even as Tam O'Shanter, who had lingered long over his nappy (ale) with convivial companions, found that it led him into further trouble and danger so, too, does his modern counterpart learn this lesson; but often only after bitter experience.

To countless Canadians, the working environment has become intolerable because of the "ills" of frustration, lack of recognition, dissatisfaction, boredom and anxiety. They have therefore turned away from these nerve-jangling realities and reached for the bottle in an attempt to soothe their troubled minds with alcohol. And, temporarily, they will succeed because alcohol has an anaesthetising effect on the brain.

Effect of Alcohol on the Body

Ethyl alcohol is absorbed directly into the blood stream through the walls of the stomach. Blood circulation takes it quickly to other parts of the body including the brain. A *small amount* affects brain centres concerned with thought and emotion:

- worry, anxiety, inhibitions and pain are dulled; hence:
- you feel less fatigued or seemingly more exhilarated.
- you are less discriminating and your judgment is impaired.

A *larger amount* affects brain centres concerned with muscle coordination, speech and the senses.[1]

Alcoholism — a total disorder

"Alcoholism is a subtle and unique disease about which we know less than we do about pneumonia, only as much perhaps as we do about cancer. Possibly for the very reason that alcoholism is a unique disease with its subtle interplay of psychological, physiological and sociological factors, we have had much difficulty understanding it," says Dr. Harold W. Lovell. Menninger research workers refer to the three most conspicuous mental health problems in industry as "the three A's — absenteeism, accidents, and alcoholism."[2]

Photo by National Film Board

Dr. John D. Armstrong, Medical Director of the Alcoholism and Drug Addiction Research Foundation of Ontario, conducts a group therapy session for alcoholics. Dr. Armstrong is shown stressing the three-fold nature of the illness. 1. physical 2. social 3. psychological.

But consideration of alcoholism solely as a disease has its limitations, because there is a personal element in the development of the condition. To disregard this personal factor and to consider alcoholism wholly as a disease can be a disservice to the problem drinker.

Constantly reiterated is the phrase, "alcoholism is an illness" or "the alcoholic is a sick man". This concept offers a ready made rationalization to the alcoholic and further deprives him of the sense of responsibility which he must develop if he is to recover. It makes it easier for the nonalcoholic public to shrug off its responsibility in the matter and leave the problem to the doctors. The words "illness" and "sick" carry the unfortunate connotation of something than can be cured by an in-

jection, a bottle of pills, or the magic of psychotherapy alone.[2]

"Nothing is further from the truth, for alcoholism is a total disorder and its management demands active participation of all who come in contact with any part of a patient's life", states Robert R. Robinson, Education Director of the Alcoholism and Drug Addiction Research Foundation, Toronto.

His opinion is shared by the author of a paper describing the Consolidated Edison Company's programme for problem drinking in which the following statistics are presented:

Type of Referral	
Company procedure	358
Medical	31
Voluntary	9
	398

Commenting on these figures the author states . . . "the majority of cases were recognized under the company procedure on alcoholism, and this reflects on the inability of purely medical or voluntary measures to face up to problem drinking in industry."[3]

The Problem Drinker

Who are these people whose condition causes trouble for themselves, their families, their employers and their friends? The World Health Organization has described them as: "those excessive drinkers whose dependence upon alcohol has attained such a degree that it shows a noticeable disturbance or an interference with their bodily or mental health, their inter-personal relations and their smooth economic functioning." Note the word "dependence". This is the key word which roughly distinguishes alcoholics from others who have (or create) problems by their drinking, without being similarly dependent.

Often the results of the individual's abnormal drinking are masked by being attributed to other causes, and he has come to be known as the "hidden man" by the group conducting research at the Yale Center of Alcohol Studies. Although he believes that he can control his drinking, it has reached such proportions that it is beginning to affect his inter-personal relationships. In addition to being drunk in the evenings and on his days off, he develops a pattern of recurrent excuses for absences due to minor illnesses.[4]

The Extent of the Problem

In industry problem drinking is exacting a tremendous toll in human misery and business profits.

"Problem drinking, or alcoholism is a public health problem of major and probably increasing concern to most communities and industries. It ranks with the first four of the major public health problems on this continent at the present time" says Dr. W. H. Cruickshank, a vice-president of the Bell Telephone Company of Canada.

For the middle-stage alcoholic, a hangover is an agonizing combination of throbbing headache, upset stomach, parched throat, burning thirst, the jitters, disturbed breathing and deadening fatigue. This is the result of being forced to drink more in trying to achieve the sense of well-being he desires. So massive has become his daily intake of alcohol that the liver is unable to slough off certain toxic substances; his body chemistry is thrown awry in a dozen different ways. He stays up too late, he smokes too much and he doesn't eat.[5] In industry there are countless such sufferers.

Specifically, the Alcoholism and Drug Addiction Research Foundation of Ontario has discovered that six percent of the people in ten plants in one Ontario county were problem drinkers. "These figures are valid; they were derived from a painstaking survey," says the Education Director of that organization.

After an exhaustive survey which included thirty thousand workers in fourteen firms, the Montreal Council of Social Agencies concluded, "Alcoholism is a major health and social problem in this city. In industry, problem drinkers occur at all levels (among) executives and supervisors, as well as clerical, skilled and unskilled workers."

In Canada, problem drinkers cost their employers an estimated $100,000,000 a year, (direct communication)[6]. This staggering sum includes the cost of slowed production, absenteeism, accidents, sickness, labor turnover, wasted materials, insulted customers, errors in executive decisions and poor plant morale.

An accounting executive recalls, "I was so beaten and tired that in a single year I made bad decisions which cost the company $150,000." An advertising vice-president says, "We were in line to get a new one-million-dollar account. Had I been able to think clearly for three or four hours on the day we made our presentation it would have been ours. But I could hardly stay awake. We lost out."[5]

A Hidden Problem

It is evident that many of the alcoholics in industry, even in companies with an alcoholism programme, masquerade under other categories. Some are covered by certificates provided by their family physicians. Others are hidden by industry itself for reasons of years of faithful service or the idea

that there is no adequate treatment. This has given rise to the erroneous concept in some quarters that alcoholism may not be considered a problem in industry. Medical experience discloses that unless there is actually a company programme in operation, management cannot have any accurate knowledge of the extent of the problem.[3]

The rather common answer by management when it is suggested that the problem of alcoholism is a serious one in his company is, "We have no problem. If we find alcoholics in our employ, we fire them. Therefore we have no problem."[7]

Dr. John Norris, Medical Director of the Eastman Kodak plant in Rochester once said: "The executive who says he has no problem of alcoholism in his plant doesn't know what he is talking about." To this statement the Executive Director of the Alcoholism and Drug Addiction Research Foundation wholeheartedly subscribed.

In the Foundation's survey of a complete Ontario county results were analyzed from ten companies each employing fewer than 200 workers. In each instance the researchers asked management to estimate the number of alcoholics in their employ, according to the definition provided for them. Following the survey the actual number of cases discovered was compared with the previously estimated number and it was found that the survey had revealed in these companies exactly *fifty percent more cases than had been estimated.* So the problem is hidden — even in the smaller companies.[7]

How can a problem drinker continue on the payroll year after year without being detected? One explanation is that, in some instances, his co-workers, his supervisor and his wife will cover up for him when his absences from work become too frequent. Once at work the drinker will protect his job by keeping away from others to avoid surveillance and by doing as little work as possible to avoid making mistakes.

Another explanation is that alcoholism is a progressive disease. Slowly, insidiously, it develops over a period of from two to fifteen years. Because there is no sudden, dramatic onset of symptoms, the early alcoholic is rarely spotted by his supervisor or co-workers. Later, as he sinks into the morass of addiction, identification is easier. What are the telltale clues?

Detecting the Problem Drinker

The key men in the recognition of early problem drinkers are the foremen and supervisor. A training programme for these people should be in operation to enable them to understand the objectives of the company programme and to assist them in recognizing early signs of problem drinking.

Here are some clues:

Absenteeism — An individual's pattern of absenteeism offers a major clue. Repeated Monday morning, post-holiday, and post payday absenteeism has been shown to reveal likely problem drinker suspects which may be confirmed by subsequent investigation. Flimsy excuses, alleged "sore back", etc., are offered. Days absent per year for the alcoholic group have been found to be about double the average for the non-alcoholic group.[8]

Accidents — Experience indicates that on-duty accidents are not excessive among problem drinkers, but they often have more than their share of off-duty accidents, particularly with assault as a factor.[8]

Personality Changes — These gradually become apparent in the developing problem drinker.[8]

Efficiency — Operating errors and incompleted work assignments become more frequent.

Other clues include:

- reports of domestic discord, financial troubles
- aroma of alcohol, hand tremor
- faster drinking
- going on longer
- habitual heavy spending on drink
- tending to drink alone
- morning drinking

What is Industry Doing?

When a problem drinker is detected in a plant, what constructive action does management take? Until recently, very little, despite the clear-cut evidence that the problem is very serious. Companies have attempted to keep alcoholics off their payrolls or to discourage employees found to be problem drinkers.

"Most Canadian businesses not only do nothing to cure this annual multi-million dollar hangover; they don't seem to know it is there", states Sidney Katz in an article in Macleans.[5]

"Shame and ignorance are at the root of this complacency. Many business leaders still regard alcoholics as wicked, morally degenerate creatures. Hence they find it distasteful to discuss bibulous employees because "it will give our Company a bad name," Katz continues. Dr. W. H. Cruickshank, of the Bell Telephone Company, explains, "Shame of the disease, alcoholism, leads to concealment and concealment leads to a further spread of the disease."

The other reason for industry's widespread lack of constructive action in combatting alcoholism is that many executives have the mistaken belief that they can spot the problem drinker instantly.

Erroneously, they picture him as the stereotyped derelict of Skid Row, unkempt, unshaven and bleary-eyed. Such an image is not accurate. Most likely he is outwardly pretty much the same as other employees in appearance, behaviour, skill and length of service. A study in one large plant revealed that eight out of ten problem drinkers had been with the firm for ten years or more.[5]

Company Programmes

Fortunately, there is a growing number of exceptions to management's laissez-faire attitude to this prevalent industrial canker that slowly infects employees and voraciously consumes business profits. Among some large and small industries there exists an enlightened attitude toward problem drinking.

Among the larger Canadian companies, Bell Telephone and Imperial Oil are two which have gone far in dealing with problem drinking as a medical matter.

Programme of the Bell Telephone Company of Canada

The Bell Telephone Company is a pioneer in the rehabilitation of alcoholics. The Bell has fewer alcoholics on its payroll than most Canadian industries. But in 1951 there were still enough to cause grave concern. In that year, a document was distributed throughout the company announcing that, henceforth, the alcoholic would be treated — not fired. The message was driven home by talks from the medical department and articles in house publications.[5] Consideration of alcoholism as a disease led to the adoption of the following policy:

1. That it be recognized that most cases of alcoholism or "problem drinking" present a health problem.
2. That each case of incipient or suspected alcoholism or "problem drinking" be encouraged to seek adequate medical investigation and advice without delay.
3. That each case involving a health problem be considered eligible for Sickness Disability Benefits or Disability Pension under the Company's Plan for Employee Pensions and Disability Benefits, if the condition is sufficiently advanced to produce disablement from work.
4. That, where possible, *final* disciplinary action in cases of alcoholism be delayed until health factors have been adequately reviewed and treatment undertaken without success.[9]

Role of the Supervisor

Not unexpectedly, Bell supervisors play an important role in the programme. When a supervisor sees that drinking is interfering with a man's work, he privately takes him aside and acquaints him with the basic facts about alcoholism. "If you keep on drinking, you'll probably get to the point where you can't go on working," he tells him. He urges the man to visit the medical department. Nearly all drinkers accept this invitation. "A man may ignore the pleadings of his family and friends but he's shocked by the suggestion that his job is in danger," a Bell medical official explains.[5]

Role of the Medical Department

The medical officer now tackles the problem. He checks on the man's physical health and discusses his drinking problem with him. This might take several visits. If necessary, he'll refer the drinker to some other source of help — the family doctor, a psychiatrist, an alcoholism clinic or AA. During the entire treatment period, the company doctor keeps in contact with the man, encouraging him and making the course as easy as possible for him. One travelling salesman, for example, was temporarily stationed in the Toronto office so he could regularly attend an AA group there.[5]

Programme of Imperial Oil Limited

This company's medical department was formed in 1947. One basic principle in the health programme is that total employee health is of direct concern to management.

"From the beginning," says the company's Medical Director, Dr. G. A. Sinclair, "we have been conscious of the need for study and control of the alcoholism problem in industry. The problem drinker has always been considered by our medical staff as an individual who has a symptom-complex produced by the action of alcohol in his body. The health programme includes the recognition, treatment and rehabilitation, of employees who are problem drinkers."[10]

"Early recognition of the problem drinker is largely dependent on the astute observation and co-operation of supervisors and management. To assist the latter, members of the medical staff arrange to speak at meetings and conferences of supervisory people at all levels. The early signs by which the problem drinker may be identified are outlined. When an employee needs help, he may be directed to the health centre by his supervisor, or he may go of his own accord for medical examination, guidance, and referral to appropriate treatment facilities, such as the family physician, the Alcoholism Research Foundation, and Alcoholics Anonymous."[10]

"The Company does not formalize this phase of their work by designating it specifically as an alcoholism programme any more than they would for diabetes, tuberculosis, or a mental disorder, when an employee is found to have one of these conditions."

"The health programme is comprehensive enough to include all of them" states Dr. Sinclair.[10]

In the United States, in addition to Consolidated Edison, notable plans are in operation at Allis-Chalmers, E. I. DuPont de Nemours, Eastman Kodak, the Norton Company and Standard Oil of New Jersey, to mention only a few. Reports are available on these.

Progress — No Panacea

Assuredly, no industrial health plan is successful in completely eradicating such a condition as problem drinking; nevertheless, companies which have had several years' experience with plans to relieve problem drinking are satisfied that the effort is worthwhile.

Several tangible results are reported: Of the Bell Telephone Company's progress, a spokesman for the company states: "Of the cases that have been seen, more than half have responded favorably to treatment. Employees with drinking problems are being recognized earlier, and thus the probability of successful rehabilitation is being increased. Dramatic results have been obtained in some instances."

Commenting on the success of the Imperial Oil Company's attempt to rehabilitate problem drinkers, Dr. Sinclair reports, "Once a problem drinker is identified and he recognizes that he has a problem and is willing to cooperate in overcoming it, the results have been good."

Other companies also report success in their attempts to reclaim alcoholics.

In the vast DuPont industry, two out of every three known alcoholics, including executives, have been successfully treated.[5]

The Allis-Chalmers Manufacturing Company reports it has cut its firing for alcoholics from 95% to 8%. They estimate that they save $80,000 a year in reduced absenteeism alone.[11]

Sources of Help

Largely responsible for the success of these programmes are the many centres of treatment for alcoholism which are more wide-spread today than ever before. In many provinces the Provincial Governments have opened treatment facilities with staffs specially trained to deal with the more complicated cases. Other provinces are studying the problem and getting ready to follow suit. To take but one example: The Alcoholism and Drug Addiction Research Foundation was established in 1949 by the Government of Ontario and was empowered to engage in research, treatment, rehabilitation, and education programmes with a view to reducing the prevalence of alcoholism. In the field of education the Foundation is giving excellent leadership.

Treatment through the Foundation is available to any resident of Ontario who has a problem with alcohol and an honest desire for help in solving it.

Another source of help is *Alcoholics Anonymous*. This organization is composed of a number of recovered alcohol addicts who are banded together for the purpose of helping themselves and other alcoholics to remain sober.

AA. has an non-sectarian religious side, but it emphasizes that alcohol addiction is a physical disease. The members consider the main cause of addiction to be emotional maladjustment. Their solution is a deep and effective spiritual experience which revolutionizes the individual's whole attitude toward life.

The job of attacking addictive drinking through social and psychological means is a job for which Alcoholics Anonymous is particularly fitted. In the past it has proved to be at least as effective as other therapeutic agencies in meeting the needs of those individuals to whom the programme appeals. On balance, AA. has probably been responsible for the recovery of more alcoholics than any other source of help; and it is certainly more readily available in communities across North America than is any other agency.

Conclusion

Alcoholism is a major health and social problem which challenges industry to do a job of rehabilitation; a job which industry is especially well fitted to undertake because it has the necessary tools — means of *detection, of motivation* of employee to seek help, and of *treatment.* Using these tools, some industries are already doing an excellent job; but regrettably such progressive industries are still in the minority.

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OCCUPATIONAL HEALTH REVIEW

"The program of the Occupational Health Division is concerned with service, research and education in the field of Occupational Health, and of Air Pollution in Canada.

The Division's activities include, environmental and clinical surveys, laboratory and consultative services; the promotion of teaching and research, and the publication of informative and educational material".

A QUARTERLY PUBLICATION